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EXAMINER	
MILLS, DONALD L	

ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/884,336	KERR ET AL.	
	Examiner	Art Unit	
	Donald L. Mills	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 22 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 22, the claim recites *storing similar entries for the same queue at a first time and a second time... the second time at a higher priority then an entry at the first time* (See claim 22, lines 2-4.) However, the specification does not teach multiple storage with higher priority.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3-6 and 17-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 3, the claim specifies *early forwarding of the packets* (See claim 3, line 2.) It is unclear from the context what comprises "early forwarding" since packets are

transmitted in accordance with their scheduled time. The meaning of "early forwarding" is unclear from the context of the claim. Further clarification and explanation is requested.

Regarding claim 17, the claim specifies *if the queue is inactive for the CIR, activating the CIR and incrementing an aggregate CIR bandwidth for a media link* (See claim 17, lines 8-9.) It is unclear from the context why it would be necessary to not only "activate the CIR" but "increment the CIR bandwidth" when the queue is empty and inactive? Further clarification and explanation is requested.

Regarding claim 20, the claim specifies *inserting the queue descriptor* (See claim 20, line 5.) The original and value of "queue descriptor" is unclear from the context of the claim, since it is retrieved by a timing wheel, which is not referenced in its the parent claim. The claim further specifies *inserting the queue descriptor in the quantum... a next time slot and further in time* (See claim 20, lines 5-6.) It is unclear from the context if the queue descriptor is inserted in or all of the above. The claim further specifies *further in time as determined by a deferral heuristic* (See claim 20, line 7.) The meaning of a "deferral heuristic" is unclear from the context of the claim. Due to the vague and indefiniteness of claim 20, a proper art search could not be completed. Further clarification and explanation is requested.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-4, 6-15, 17-21, and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Fan et al. (US 6,408,005 B1), hereinafter referred to as Fan.

Regarding claims 1, 7, 10, 21, and 23 Fan discloses a dynamic rate control scheduler for ATM networks, which comprises:

Assigning committed information bit rate and excess information bit rate bandwidth values per queue, along with a shaped maximum bit rate per media link (Referring to Figure 6, the DRC distributes bandwidth to support minimum guaranteed rate per stream and distributes any unused bandwidth to users based upon criteria. See column 8, lines 10-17.)

Uniformly scaling the EIR bandwidths of all queues sharing a media link so that the sum of all scaled EIR bandwidths equals an available bandwidth of the shaped media link (Referring to Figure 6, the DRC distributes bandwidth any unused bandwidth to users based upon weights assigned to the streams. The DRC utilizes a time wheel data structure implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. See column 8, lines 17-18 and column 18, lines 30-35.)

Calculating when the queue is next eligible for servicing (Referring to Figure 8, the queue activity is determined to select for servicing. See column 16, lines 6-9.)

Storing event notifications in a timing wheel having hash entries identifying a queue, a media link, and a priority, that are triggered when a queue is eligible for serving (Referring to Figure 8, timestamps are stored regarding the queue times for servicing in a timing wheel with

priority level and VC identifiers, logically equivalent to hash entries since they act merely as identifiers. See column 16, lines 40-50.)

Regarding claim 2, Fan discloses *wherein the step of storing comprises the step of providing a timing wheel having a plurality of fields per time slot, wherein the fields represent different service priorities of queues* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, of VC identifiers whose timestamps correspond to the bin label. See column 18, lines 30-33.)

Regarding claim 3, Fan discloses *wherein the step of providing a timing wheel comprises the step of configuring pointers to the queues to enable early forwarding of the packets to thereby obviate overhead incurred when searching the timing wheel for other references to the packets* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. See column 18, lines 30-35.)

Regarding claims 4 and 11, Fan discloses *wherein the step of providing a timing wheel further comprises organizing the timing wheel as a contiguous array of time slots containing pointers to linked lists* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. See column 18, lines 30-35.)

Regarding claims 6 and 15, Fan discloses *wherein the step of providing a timing wheel further comprises organizing the timing wheel as a descriptor ring having a plurality of per-time-slot queues* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, of VC identifiers whose timestamps correspond to the bin label, logically equivalent to a descriptor ring. During each time slot, the current time CT advances to point to the next bin. See column 18, lines 30-35.)

Regarding claim 8, Fan discloses *wherein the queue scheduler comprises an EIR scaler that uniformly scales the EIR bandwidths of all queues sharing a media link so that the sum of all scaled EIR bandwidths equals an available bandwidth of the shaped media link* (Referring to Figure 6, the DRC distributes bandwidth any unused bandwidth to users based upon weights assigned to the streams; thereby, scaling to the available bandwidth of the link. See column 8, lines 17-18.)

Regarding claim 9, Fan discloses *wherein the queue scheduler further comprises a virtual time policer configured to determine whether the media links are compliant and to calculate when a queue is next eligible for servicing* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. See column 18, lines 30-35.)

Regarding claim 12, Fan discloses *wherein the queue descriptor include a queue index that references a class queue of the queuing logic* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for

each priority level, (queue index that references a class of queue) of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. See column 18, lines 30-35.)

Regarding claim 13, Fan discloses *wherein the queue descriptors include a media link interface that references a media link coupled to the intermediate station* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, (queue index that references a class of queue) of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. Since, only one output link is shown the linked list inherently references the only output link coupled to the node. See column 18, lines 30-35.)

Regarding claim 14, Fan discloses *wherein the queue descriptors include a priority value indicating a priority level assigned to a queue* (Referring to Figure 8, a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level, (queue index that references a class of queue) of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin. See column 18, lines 30-35.)

Regarding claim 17, Fan discloses a dynamic rate control scheduler for ATM networks, which comprises:

Notifying a queue scheduler when each packet is forwarded to a queue (Referring to Figure 6, a given queue is scheduled when the queue is empty and a new cell arrives to the queue, inherently requiring notification of scheduler in order to process the packet. See column 16, lines 7-9;)

Determining if the queue is inactive for a committed information bit rate and for an excess information bit rate (Referring to Figure 6, a given queue is scheduled when the queue is empty and a new cell arrives to the queue, inherently requiring notification of scheduler in order to process the packet. See column 16, lines 7-9;)

If the queue is inactive for the CIR, activating the CIR and incrementing an aggregate CIR bandwidth for a media link (Referring to Figure 6, if the measured QoS exceeds the target bandwidth, some of the bandwidth is taken away form the stream and made available to other streams which are in need of bandwidth. See column 21, lines 16-20;)

If the queue is not inactive for the CIR, activating the EIR rate and incrementing the aggregate EIR bandwidth for the link (Referring to Figure 6, if the measured QoS falls below the target QoS, more bandwidth is allocated to the stream based on the ratio of its perceived QoS to its target QoS. See column 21, lines 65-67 and column 22, lines 1-5;) *and*

Calculating an EIR scale factor of the link (Referring to Figure 6, if the measured QoS falls below the target QoS, more bandwidth is allocated to the stream based on the ratio of its perceived QoS to its target QoS. See column 21, lines 65-67 and column 22, lines 1-5.)

Regarding claim 18, Fan discloses the method further comprising:

Retrieving a queue descriptor from the timing wheel, wherein the queue descriptor includes a queue index, a media link interface, and a priority value; Comparing a calculated link VTP timestamp of a media link queue with a current real time and burst value to ensure that collisions between an eligible queue and other queues do not cause the media link queue to exceed a configurable limit; If the media link queue does not exceed the configurable limit, issuing a dequeue command to the queuing logic for the eligible queue; In response to the

command, dequeueing a packet from the eligible queue; Returning a length of the dequeued packet as dequeue status to the queue scheduler; and If the queue length is non-zero, sending the dequeued packet to a media controller for loading into the media link queue (Referring to Figure 6, a mechanism is provided whereby a queue is scheduled at its minimum guaranteed rate if its associated timestamp falls behind current time by a designated amount. Scheduling a queue at its minimum guaranteed rate allows its timestamp to 'catch up' with the current time clock, by slowing down the rate at which the queue is being scheduled. See column 16, lines 40-50. Further, timestamps are stored regarding the queue times for servicing in a timing wheel with priority level and VC identifiers, logically equivalent to hash entries since they act merely as identifiers. See column 16, lines 40-50.))

Regarding claim 19, Fan discloses the method further comprising:

Periodically sending depth threshold status of the media link queue to the queue scheduler; IF the depth threshold status indicates that there are more bits in the media link queue than the link VTP timestamp represents, incrementing the link VTP timestamp; Correlating the dequeue status with the issued dequeue command; If a dequeued byte count is non-zero, marking the queue as eligible for servicing; if the dequeued byte count is zero, deactivating one of the CIR and EIR of the queue; and decrementing one of the CIR and EIR aggregate bandwidths of the link (Referring to Figure 6, if the measured QoS exceeds the target bandwidth, some of the bandwidth is taken away form the stream and made available to other streams which are in need of bandwidth. See column 21, lines 16-20.)

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fan et al. (US 6,408,005 B1), hereinafter referred to as Fan.

Regarding claim 5 as explained in the rejection of claim 1, Fan discloses all of the claim limitations of claim 1 (parent claim).

Fan does not expressly disclose *wherein the contiguous array is a hash array and wherein the linked lists are hash lists.*

However, Fan teaches a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level) of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin (See column 18, lines 30-35.)

It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the bins of Fan's timing wheel as a hash array and the linked lists as hash lists. One of ordinary skill in the art would have been motivated to do so in order to improve the efficiency of the timing wheel by minimizing search time through the tens of thousands of VCs as taught by Fan (See column 18, lines 26-27.)

Regarding claim 22 as explained in the rejection of claim 21, Fan discloses all of the claim limitations of claim 1 (parent claim).

Fan does not disclose *storing similar entries for the same queue at a first time and a second time, where the second time is further in the future than the first time, and an entry at the second time is a higher priority then an entry at the first time.*

However, Fan teaches a time wheel data structure is implemented with each bin in the time wheel pointing to four linked lists, one for each priority level) of VC identifiers whose timestamps correspond to the bin label. During each time slot, the current time CT advances to point to the next bin (See column 18, lines 30-35.)

It would have been obvious to one of ordinary skill at the time of the invention to implement redundancy storage in the system of Fan. One of ordinary skill in the art at the time of the invention would have been motivated to do so in order to make the system more efficient and less prone to error.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fan et al. (US 6,408,005 B1), hereinafter referred to as Fan, in view of Gemar et al. (US 6,483,839 B1), hereinafter referred to as Gemar.

Regarding claim 16 as explained in the rejection statement of claim 7, Fan discloses all of the claim limitations of claim 7 (parent claim).

Fan does not disclose *wherein the descriptor ring comprises an array of time slots, wherein each slot contains a queue-depth index that references a tail of a list of descriptors.*

Gemar discloses scheduling multiple and simultaneous traffic in guaranteed frame rate in ATM communication system, which comprises a linked list **64** of connections for VBR that

moves out traffic by a head point in column **60** of queue **38** and a tail point in column **62** of queue **38** (See column 8, lines 5-8.)

It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the tail pointer of Gemar in the system of Fan. One of ordinary skill in the art would have been motivated to do so in order to indicate the last transmission slot.

Response to Arguments

10. Applicant's arguments filed 06 February 2006 have been fully considered but they are not persuasive.

Rejection Under 35 USC 112

On page 11 of the remarks, regarding claim 3, the Applicant argues "early forwarding" is the "early forwarding of the packets" and, therefore, clear. The Examiner respectfully disagrees. The Applicant has not set forth in the claims the meaning of "early forwarding".

On page 13 of the remarks, regarding claim 17, the Applicant argues "if the queue is inactive for the CIR, activating the CIR and incrementing an aggregate CIR bandwidth for a media link" is clear. The Examiner respectfully disagrees. It is unclear from the context why it would be necessary to not only "activate the CIR" but "increment the CIR bandwidth" when the queue is empty and inactive? The Applicant states, "the step is to increment the aggregate CIR bandwidth, which is accomplished by assigning guaranteed CIR bandwidth to the now active queue" (See page 13 of the remarks, paragraph 1.) However, there is no mention of an "active queue" in the claim.

On page 13 of the remarks, regarding claim 20, the Applicant argues the inclusion of information in claim 18 defines the "queue descriptor". The Examiner respectfully disagrees. The original and value of "queue descriptor" is unclear from the context of the claim, since it is retrieved by a timing wheel, which is not referenced in its the parent claim.

Rejection Under 35 USC 102

On page 14 of the remarks, regarding claim 1, the Applicant argues Fan does not disclose *storing event notifications in a timing wheel having hash entries identifying a queue, a media link, and a priority, that are triggered when a queue is eligible for serving.* The Examiner respectfully disagrees. Fan discloses, referring to Figure 8, timestamps are stored regarding the queue times for servicing in a timing wheel with priority level and VC identifiers, logically equivalent to hash entries since they act merely as identifiers (See column 16, lines 40-50.) Therefore, Fan discloses *storing event notifications in a timing wheel having hash entries identifying a queue, a media link, and a priority, that are triggered when a queue is eligible for serving.*

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald L. Mills whose telephone number is 571-272-3094. The examiner can normally be reached on 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Seema S. Rao 5/15/06

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Donald L Mills

DLM

May 12, 2006